

Melanoplus stonei in Michigan (Orth., Acrid.).

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The large collection of Orthoptera made at Sand Point, Huron County, Michigan, by the Michigan Biological Survey expedition of 1908, contained a series of fourteen specimens of a grasshopper which was determined by Mr. A. P. Morse as *Melanoplus foedus* Scudder. In 1911 these specimens were recorded under that name by their collector, Mr. A. F. Shull, in his report on the Thysanoptera and Orthoptera of the region.

Since this constituted the only record for the species from east of the Mississippi River it was of considerable interest. In 1918 Mr. W. S. Blatchley requested the loan of the specimens for study. Regarding them he wrote: "I found that the specimens were correctly named *Melanoplus foedus* by Morse, but that name is a synonym of *Melanoplus packardii* Scudder. The specimens from Michigan agree exactly with red-legged specimens from Colorado, except in size, they being slightly smaller than average *packardii*." In his "Orthoptera of Northeastern America" Blatchley has included *Melanoplus packardii* in his treatment of the eastern species of the genus on the basis of this one record, the only one for either *foedus* or *packardii* in the area covered.

On August 26, 1919, I found a small number of specimens on the shore of Crystal Lake, Michigan, which were identified as *packardii* on the strength of Blatchley's determination of the Huron County material, with which they entirely agreed. A short time later other specimens of the same species were received from Miss Priscilla Butler, which were collected in July and August of the same year at Douglas Lake, Michigan. Specimens from all three of these localities were sent to Mr. J. A. G. Rehn to have the identification verified. They were named by him *Melanoplus stonei* Rehn, Mr. Morgan Hebard concurring with him in this determination.

Melanoplus stonei was described by Rehn in 1904 from the pine barrens of New Jersey. According to its author, it is "a member of the Packardii Group and related to *M. packardii*

and *foedus*, but distinguished by the smaller size, more compressed and excavated vertex and fastigium, the narrower frontal costa (which also has a distinct stricture below the junction with the fastigium), the smaller furcula, the greater interval between the mesosternal lobes in both sexes, and in the rich and striking coloration." I have compared Michigan specimens of *stonci* with specimens of *packardii* from North Dakota, Oklahoma and Colorado, and it is evident that in spite of slight variation, especially in color, *stonei* is perfectly distinct in the characters pointed out by Rehn, and there should be no real difficulty in separating the two species. It is necessary, therefore, to drop *Melanoplus packardii* from the eastern list, as the only record of the species east of the Mississippi is based on a misidentification.

Since 1919 extensive field work has shown that *Melanoplus stonci* has a rather general distribution in northern Michigan. It has been taken in a dozen localities, and has proved to be common and even locally abundant in its characteristic habitat. This is the more remarkable, since the surprisingly small number of records of *stonci* published in the twenty years since its description seems to indicate that elsewhere it is either rare or very local in its occurrence.

Melanoplus stonci is quite definite in its habitat preferences, and close observation of the species in the field soon enables one to predict with a fair degree of certainty whether or not it will be found in any particular situation. In New Jersey *stonei* is stated to occur only in the northern portion of the pine barrens, and Rehn notes that it is apparently rather abundant there in dry scrubby pine land. In Michigan I have found it in much the same sort of situations. Its favorite home is the great area of jack-pine barrens in the northern part of the state.

In the Huron Mountain region of Marquette County the species is common in burned-over pine barrens a short distance inland from the shore of Lake Superior. The dominant tree of the thin and irregular forest which covers these sandy plains is the jack-pine (*Pinus banksiana*), a close relative of the Jer-

sey scrub pine. The more open portions (considerable areas are almost without tree growth) support a scanty ground vegetation of blueberry bushes, bracken ferns, and clumps of xerophilous grasses, while much of the sandy soil is bare except for a covering of gray reindeer moss. Most of the Orthoptera associated with *M. stonei* in this habitat are species characteristic of bare soil or scanty vegetation—some of the more numerous being *Camnula pellucida*, *Spharagemon collaris scudderi*, *Circotettix verruculatus*, *Scirtetica marmorata marmorata*, *Melanoplus mexicanus atlanis* and *M. fasciatus*.

In the lower peninsula *M. stonei* was found to be abundant in a slightly less xerophytic type of habitat in Montmorency County. Here, in the burned-over barrens of this region, the species is most numerous in the more open country between the pine groves, where the scattered jack-pines are interspersed with an occasional scrubby oak, aspen, sand cherry or Juneberry. There is more ground vegetation; the sandy soil is covered with a thin sod of grasses, while sweet fern, bracken, several species of blueberries, and a number of hardy flowering herbs grow here. Reindeer moss is not common. The greater supply of food and the less rigorous conditions of life are reflected in the larger number of species and individuals of grasshoppers found in this area. *Melanoplus confusus* appeared to be the dominant form, with *M. stonei*, *Pseudopomala brachyptera* and *Orphulella speciosa* common. *Arphia sulphurea*, *Spharagemon bolli*, *Camnula pellucida*, *Melanoplus fasciatus* and *M. dawseni* were also taken in numbers, while *Chloea conspersa*, *Scirtetica marmorata marmorata*, *Hesperotettix pratensis*,¹ *Melanoplus mexicanus atlanis*, *Phaneroptera pistillata*, *Conocephalus saltans*, *Gryllus assimilis* and *Nemobius fasciatus* were less numerous.

I have also found *Melanoplus stonei* in the dune belts along the shores of the Great Lakes in the straights region. The situation in which it was found at Crystal Lake is fairly typical of the conditions under which I have taken it along the lake shores. Crystal Lake was formerly a deep arm of Lake Michi-

¹ July 11-14, 1923; 5 ♂, 5 ♀, 3 juv. The first Michigan record.

gan, the mouth of which has been blocked by a high ridge of dune sand. On a portion of the north shore steep clay bluffs descend to the level of the broad sandy beach, and for a distance of several yards from the base of the bluff the beach is covered with a thick but uneven growth of bearberry (*Arctostaphylos uva-ursi*) and two species of scrubby Juniper (*Juniperus horizontalis* and *J. communis depressa*), with a few other characteristic beach plants. *Melanoplus stonci* was found in small numbers in openings in this mat of vegetation, among the dead leaves and twigs which litter the sand.

Shull's records state that his specimens were found "on bare or somewhat grassy beaches, or in sandy woods, always in dry places. Found on sand or soil, not on vegetation." In 1922 I also found *stonci* common on Sand Point, in the grass and blueberry undergrowth of the open oak and jack-pine forests on the sandy ridges back of the beach. Rehn writes that he has never found *stonci* in the types of habitat frequented by *packardii* [open grassy prairie, pastures, cultivated land, weed thickets, etc.], but always in brushy woodland, generally on poor soil. At Godbout, Quebec, Mr. E. M. Walker found it "on the coarse grasses of a sea-beach, and sparingly in open jack-pine barrens."

In his excellent ecological study of the Acrididae of the Douglas Lake region, and in a subsequent paper in Entomological News, Mr. A. G. Vestal has recorded *Melanoplus angustipennis* from Douglas Lake, Cheboygan County, Michigan. He lists this species as a dominant form of the bracken-blueberry habitat, and as frequent or occasional in bare soil, beach grass and ruderal grassland habitats. It is remarkable that, in the several rather large collections of Orthoptera which have been made by subsequent workers at the Douglas Lake Biological Station, I have never seen a specimen of *M. angustipennis*, while *M. stonci*, which Vestal does not mention, was well represented. This makes me suspect that the species which he regarded as *M. angustipennis* may in reality have been *M. stonci*, whose habitat distribution, as I have observed it, seems to accord well with that which he gives for his *M. angustipen-*

nis. The latter species does occur in Michigan, as I have specimens from Berrien, Wayne, Oakland and Gratiot counties. All of these records are, however, from the southern portion of the lower peninsula, and in my own collecting I have never found it in the northern part of the state.

The earliest Michigan record of adult specimens of *Melanoplus stonei* is June 20 (Sand Point). On this date it was apparently just maturing, as many of the specimens seen were teneral, and late nymphal stages were numerous. In July and early August it reaches its greatest abundance in Michigan; but it is not known how late it may occur, as there has been no collecting later than August 26 in the parts of the state where it is found.

The present status of the species is indicated below:

***Melanoplus stonei* Rehn.**

1904. Rehn, Ent. News, xv, 85. [Between Harris and White Horse, Burlington County, New Jersey (Type locality); Atsion, Burlington County, New Jersey.]
1910. Smith, Ann. Rept. N. J. State Mus., 1909, 184. [Stafford's Forge, New Jersey.] [In the low scrub under mixed pine and oak and on bare sand near pine woods.]
1914. Fox, Proc. Acad. Nat. Sci. Phil., 1914, 514. [Restricted to the New Jersey Pine Barrens, and so far reported only from its northern portion.]
1920. Blatchley, Orth. Northeastern Amer., 432. [Chatsworth and Harris, New Jersey; Godbout, Quebec; Ft. William, Ontario.]
1921. Hubbell, 22nd Rept. Mich. Acad. Sci., 1920, 125. [Douglas Lake, Cheboygan County; Crystal Lake, Benzie County; Sand Point, Huron County, Michigan.]
- Melanoplus foedus* Shull 1911 (not of Scudder 1879), Mich. Geol. Biol. Surv. Publ. 4, Biol. Ser. 2, 227. [Saginaw Bay [Sand Point], Huron County, Michigan.]
- Melanoplus packardii* Blatchley 1920 (in part, not of Scudder 1878), l. c., 430. [Saginaw Bay, Huron County, Mich.]
- ? *Melanoplus angustipennis* Vestal 1913 (? not of Dodge 1877), Biol. Bull., xxv, 145, 147, 149, 153, 163, 165, 168,

171, 173, 176. [Douglas Lake, Cheboygan County, Michigan. Detailed ecological study.]

1914. Vestal, Ent. News, xxv, 108. [Douglas Lake, Cheboygan County, Michigan.]

The Michigan records are as follows:

Northern Peninsula—

Marquette County: Huron Mountain Club, vii. 8-19. 1921 (T.H.H.) 14 ♂, 10 ♀.

Mackinac County: St. Ignace, vii. 24. 1921 (T.H.H.) 9 ♀; Naubinway, vii. 29. 1921 (T.H.H.) 2 ♂, 2 ♀.

Southern Peninsula—

Cheboygan County: Douglas Lake, vii. 3-viii. 9. 1919 (Priscilla Butler) 1 ♂, 9 ♀; vii. 19. 1920 (H.H. Lü) 1 ♂.

Emmett County: Big Stone Bay, vii. 30. 1921 (T.H.H.) 3 ♂, 17 ♀.

Charlevoix County: High Island, vii. 7. 1922 (S. Moore) 1 ♀; Sec. 1, Norwood twp., viii. 7. 1923 (T.H.H.) 1 ♀.

Montmorency County: T. 32 N., R. 1 E., vii. 10-12. 1923 (T.H.H.) 34 ♂, 55 ♀.

Alcona County: Harrisville, viii. 10. 1921 (F. M. Gaige) 2 ♂, 5 ♀.

Benzie County: Crystal Lake, viii. 26. 1919 (T.H.H.) 2 ♂, 3 ♀.

Clare County: Lake George, vii. 10-24. 1921 (H. M. MacCurdy) 1 ♀.

Huron County: Sand Point, vi. 22-viii. 3. 1908 (A. F. Shull) 10 ♂, 4 ♀; vi. 20-27. 1922 (T. H. H. and R. F. Hussey) 9 ♂, 3 ♀.

McCook's Ant Mounds in Pennsylvania, Revisited (Hymen.: Formicidae).

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Among the remarkable native animals of the Eastern parts of the United States are the mound building ants which may be found in clearings, cut over woods, abandoned fields and little frequented areas not given up to agriculture or intensive grazing. With increase of human population these ant mounds seem doomed to ever greater restriction and ultimate extinction, some phases of which process may be witnessed readily.

Their headquarters along the Alleghanies seem less densely